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Policy Analysis of Water Management: Strategies for Whatcom County, Washington to Address Permit-Exempt Wells in Water-Constrained Watersheds

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POLICY ANALYSIS OF WATER MANAGEMENT: STRATEGIES FOR WHATCOM COUNTY, WASHINGTON TO ADDRESS PERMIT-EXEMPT WELLS IN WATER-CONSTRAINED WATERSHEDS

By

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A Field Project
Presented to
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In Partial Fulfillment
Of the Requirements for the Degree
Master of Environmental Studies

by
Sydney Schlotterback
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Abstract

Whatcom County, Washington is currently under pressure to develop a water resource management plan to come into compliance with Washington State law, including recent legislation set forth in Engrossed Senate Substitute Bill (ESSB) 6091 (January 18,2018). ESSB 6091 requires Whatcom County to engage in a planning process to mitigate for water withdrawals for new permit-exempt wells and to ensure that new water users over a twenty-year period do not result in decreased ecological function of instream resources. It responds to the Washington State Supreme Court's recent decision in *Whatcom County v. Hirst, Futurewise, et al*, often referred to as the "*Hirst*" case. *Hirst* ruled that Whatcom County failed to protect rural character as required by the GMA because its Comprehensive Plan did not include measures that would adequately protect water quality and quantity. The GMA requires Whatcom County to contain or otherwise control rural development and protect surface water and groundwater resources. The purpose of this policy analysis is to discuss and compare three policy options that are proposed to Whatcom County as possible solutions to address the requirements in *Hirst* and ESSB 6091. These policy options are the construction of reservoirs to provide water storage capacity, the extension of existing public water supplies to serve areas that do not have such service, and the development of a water banking program. Three criteria will be used to evaluate each policy option: cost-effectiveness, implementation/feasibility, and compliance with law. Of the three options that are commonly proposed answers to Whatcom County's problems of water shortage and depleted instream flows, water banking is the recommended policy solution. In addition, comprehensive planning and conservation are recommended to help ensure the success of any policy intended to address water scarcity problems. Other options for water resource management likely exist and could be applied to Whatcom County. Due to research and time limitations, a narrowed focus on three policy options allowed for initial determination of an effective policy solution.

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Introduction

In much of the western United States, water resources have been severely depleted through over appropriation and allocation.[1] To address water constraints, many counties in Washington State are working to develop management strategies, including the implementation of water banking programs. Water banking relies on the accumulation of surplus or unused water rights, which can then be allocated to water users or applied to instream flow requirements.[2]

Whatcom County, Washington is currently under pressure to develop a water resource management plan to come into compliance with Washington State law.[3] Although water sources in much of Whatcom County's rural area have been over-appropriated, Whatcom County has always issued building permits and subdivision approvals for development relying on "permit-exempt" wells whenever groundwater is physically available. Permit-exempt wells fall under a provision of state water law that provides for the withdrawal of up to 5,000 gallons of water per day for domestic uses without obtaining a water rights permit from the State Department of Ecology (RCW 90.44.050).[4] In *Whatcom County v. Western Washington Growth Management Hearings Board*,[5] commonly referred to as the *"Hirst"* decision in reference to one of the local litigants, the Washington State Supreme Court ruled that Whatcom County was not protecting water resources, including water quantity, in its rural area as required by the state Growth Management Act (GMA). The Supreme Court held that Whatcom County must ensure that applicants for new development relying on permit-exempt wells can demonstrate that water is legally, not just physically, available for use. The court cited precedent establishing that permit-exempt wells are only exempt from the requirement to obtain a permit, however, and

are otherwise subject to state water law.[6] Thus, the state law of prior appropriation, or first in time, first in right, applies to new permit-exempt wells.[7] In areas where no water is available for new users, local governments were concerned that new development will be precluded.

In response to these concerns, the Washington State legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 on January 18, 2018. ESSB 6091 allows new rural permit-exempt wells to contravene the state law of prior appropriation. Permit-exempt wells are allowed to take water from closed watersheds, regardless of the legal availability of water.[8] The law requires future mitigation for such withdrawals including options such as "acquiring senior water rights, water conservation, water reuse, stream gauging, groundwater monitoring, and developing natural and constructed infrastructure, which includes, but is not limited to, such projects as floodplain restoration, off-channel storage, and aquifer recharge."[9]

In Whatcom County, ESSB 6091 requires updated watershed plans and involvement of the watershed planning unit. The watershed plan was originally implemented through the Watershed Planning Act with the purpose of developing "a more thorough and cooperative method of determining what the current water resource situation is in each water resource inventory area" and involving the public and a wide range of stakeholders for guidance.[10] The planning unit is comprised of "general purpose governments" (i.e. tribes, counties, cities, and states) and "water resource interests" (i.e. fishers, agriculture, water districts).[11] The planning unit is established by city, county, and local governing bodies, known as initiating governments, to "provide a process to allow…local citizens…to join together in an effort to: (a) assess the status of water resources…and (b) determine how best to manage the water resources" in their area.[12]

It is important to note the role of tribes in the watershed plan. ESSB 6091 does not apply directly to Whatcom County's two federally recognized tribes, the Lummi Nation and the Nooksack Tribe, which are sovereign governments. The implementation of ESSB 6091 will affect the tribes, however, because the tribes have usual and accustomed fishing grounds outside the reservations on rivers and streams within Whatcom County. Tribes assert that these fishing rights require the maintenance of sufficient water in streams to support fish, providing tribes with senior water rights dating back to time immemorial.[1] Water allocation decisions will affect usual and accustomed fishing grounds and, therefore, directly affect tribes. ESSB 6091 states, however, that tribes should be "invited" to participate in the process of updating the watershed plan.[13]

Through the watershed plan review, Whatcom County is required to "identify the potential impacts of exempt well use, identify evidence-based conservation measures, and identify projects to improve watershed health."[14] The watershed plan must, at a minimum, "offset potential impacts to instream flows associated with permit-exempt domestic water use."[15] It must further ensure that mitigation for new water users over the next twenty years "will result in a net ecological benefit to instream resources within the water resource inventory area."[16] Through these requirements, ESSB 6091 provides a framework for Whatcom County to comply with state law.

To address the need for water resource planning and permit-exempt well mitigation, Whatcom County could implement several policy responses, including planning solutions and

[1] The argument that the tribes' treaty rights "impliedly incorporate a right to protection of fishery environments from human-caused degradation," including the dewatering of rivers and streams, is described in Vincent Mulier, Reconizing the Full Scope of the Right to Take Fish Under the Stevens Treaties: History of Fishing Rights Litigation in the Pacific Northwest, 31 American Indian Law Review 41, 77-91 (2006/2007).

mitigation. Planning solutions involve integrating land use planning and water resource planning through understanding the relationship between land and water use. Mitigation includes water banking, reservoir construction, and increasing existing water resource infrastructure. Kittitas County, in central Washington, provides one example of an approach that primarily relies on mitigation. In response to a previous Supreme Court ruling on GMA compliance,[17] Kittitas County created a water exchange program that might serve as a model for Whatcom County to develop a water resource management plan through mitigation to address the short-term requirement from ESSB 6091.

Addressing water scarcity in Whatcom County will likely call for an integrated approach. A single policy option to solve all of Whatcom County's water problems is not only unlikely but limits Whatcom County's adaptability for increasing development and decreasing water resources. Developing a policy plan that incorporates planning and mitigation may best serve Whatcom County's long term changing development and water resource needs.

Problem Statement

Whatcom County needs to comply with state law, including new requirements set forth in ESSB 6091. This new law requires Whatcom County to engage in a planning process to mitigate for water withdrawals for new permit-exempt wells and to ensure that new water users over a twenty-year period do not result in decreased ecological function of instream resources. ESSB 6091 reacted to the Washington State Supreme Court's recent decision in *Whatcom County v. Hirst, Futurewise, et al*,[1] often referred to as the "*Hirst*" case. *Hirst* ruled that Whatcom County failed to protect rural character as required by the GMA because its Comprehensive Plan

did not include measures that would adequately protect water quality and quantity. The GMA requires Whatcom County to contain or otherwise control rural development and protect surface water and groundwater resources.[2] It also requires Whatcom County to ensure that applicants for building permits and subdivisions relying on permit-exempt wells can show that water is legally available.[3] The state Supreme Court found that Whatcom County had not met the requirement to protect water quantity because Whatcom County approves subdivisions and building permits for projects relying on permit-exempt wells without requiring the applicant to show that water is legally available.[4] The court based its holding on the fact that permit-exempt wells in hydraulic continuity with surface water could be infringing on the rights of senior water users, including "instream flows," a measure of water to be left in rivers in order to protect the public's interest in habitat, aesthetics, and recreation.[5] The court cited evidence of water shortages, including closed basins (where water is over-appropriated seasonally or year-round) and basins with unmet instream flows. This ruling effectively applied the state law of prior appropriation to permit-exempt wells, which Whatcom County had treated as exempt from the requirement to avoid impairment of senior water rights.

By using permit-exempt wells as a way to allow increased development in areas with limited legally and physically available water, Whatcom County has over-allocated its water resources and needs to develop a solution in order to meet current and future water resource needs. Although ESSB 6091 allows this practice to continue, it requires Whatcom County to develop measures to mitigate the impacts of development that relies on over-allocated water sources.

Background

Like other western states, Washington State's water law follows the doctrine of prior appropriation. State law provides that "Subject to existing rights all water within the state belong to the public, and any right thereto…shall be hereafter acquired only by appropriation for a beneficial use and…the first in time shall be the first in right."[1] Under this "first in time, first in right" system, water users with the earliest, or senior, priority date (defined as when the water user began diverting water for beneficial use) must be able to meet their water needs before later priority date, or junior, water right holders can withdraw water. Junior water right holders must curtail their water usage if it impairs senior water right holders' water availability.

Within Washington State, instream flows are considered to be water rights, with priority rights under prior appropriation dating to the year of their creation.[2] The State Department of Ecology establishes instream flow rules for specific basins based on the amount of water necessary to stay instream in order to provide adequate "levels necessary to provide for preservation of wildlife, fish, scenic, aesthetic, and other environmental values, and navigational values, as well as recreation and water quality."[3] In 1985, Ecology established minimum instream flows within the Nooksack Basin, including closing streams from further water appropriation. The effective date of Ecology's "Nooksack Rule" establishes a priority date of 1986 for instream flows.[4]

Permit-exempt wells were originally intended for minimal water withdrawals for single family homes, small developments, and small agricultural operations.[5] The State established permit-exempt wells as an exception to the requirement to obtain permits for groundwater

withdrawals after June 6, 1945.[6] New water users had to obtain a water right permit in order to appropriate groundwater,[2] unless "for single or group domestic uses in an amount not exceeding five thousand gallons a day."[7] These wells are then considered permit-exempt and are not required to go through the Department of Ecology standard water right permitting process for water users withdrawing over 5,000 gallons/day.[8] Permit exempt wells are provided the same right as other formally obtained water rights in that they "may not be impaired by a junior withdrawal"[9] and may not impair senior water rights.

Groundwater withdrawals affect surface waters through hydraulic continuity, or the connection between surface and groundwater resources. *Postema v. Pollution Control Hearings Board*, a Washington Supreme Court decision from 2000, established the importance of hydraulic continuity in relation to water withdrawals.[10] *Postema* held that, if hydraulic continuity is present, groundwater withdrawals cannot be permitted if they impair surface water or instream flows.[11]

The Supreme Court further clarified the use of permit-exempt wells in the 2002 case, *Department of Ecology v. Campbell & Gwinn.*[12] State law allows permit-exempt wells to be used for small developments so long as the 5,000 gallons of water per day limit is still upheld.[13] *Campbell & Gwinn* clarified this rule by establishing that developments can use permit exempt wells so long as the whole development withdraws 5,000 gallons per day or less. If a combination of permit-exempts wells in a subdivision withdraw more than 5,000 gallons/day, then they are "considered a single withdrawal of groundwater and is not exempt from permitting requirements."[14] The court further established that permit-exempt wells are treated

[2] Washington State required permits for surface water withdrawals in 1917. RCW 90.03.005 and 90.03.250

as any other water right, including establishing a priority date based on the commencement of beneficial use and being subject to prior appropriation. The court held "once the appropriator perfects the right by actual application of the water to beneficial use, the right is otherwise treated in the same way…RCW 90.44.050 [and] it is subject to the basic principle of water rights acquired by prior appropriation."[15]

The Supreme Court first interpreted state law establishing local governments' responsibility to ensure water availability under the GMA in *Kittitas v. Eastern Washington Growth Management Board* in 2011. The court found "the County must regulate to some extent to assure that land use is not inconsistent with available water resources... Additional GMA provisions, codified at RCW 19.27.097 and 58.17.110, require counties to assure adequate potable water is available when issuing building permits and approving subdivision applications."[16] The court rejected the argument that state law preempted local governments from addressing water resources, finding instead that counties are accountable for land use planning that protects water resources while still working in conjunction with the Department of Ecology.

The Supreme Court emphasized the importance of instream flows in *Swinomish Indian Tribal Community v. State Department of Ecology* (2013), where the Court found that Ecology overstepped its authority by allowing impairment of instream flows. State law provides one exception that allows Ecology to impair instream flows, once they have been established. This exception requires a determination that "overriding consideration of the public interest" (OCPI) require the impairment of instream flows. This exception states that "withdrawals of water which would conflict [with the preservation of senior instream flows] shall be authorized only in

those situations where it is clear that overriding considerations of the public interest will be served."[17] Ecology argued that it could use a balancing test "of its own devising," which allowed it to determine that economic development from rural development outweighed a "small loss" to fishing and other public values.[3] The court rejected Ecology's effort to support rural development by allocating a portion of instream flows for permit-exempt wells, reasoning that the Department of Ecology was reallocating "existing water rights to exempt well and rural public water supply systems as a planning tool for future rural development," which is not supported by the "narrow" OCPI exception cited above. Nor does the exception permit a "jump to the head of the line" priority for permit-exempt wells.[18]

The Court again emphasized the need for strict protection of instream flows in *Foster v. Department of Ecology* (2015), where the court imposed a strict requirement for mitigation of water taken from senior instream flows.[19] The Department of Ecology approved a water right permit that would impair senior instream flow water rights. It applied the OCPI exception to allow for the impairment in combination with a mitigation package. The mitigation package, however, improved habitats rather than protecting the water available for senior water right holders. Ecology argued that the mitigation plan "would mitigate the impairment to minimum flows by creating a net ecological benefit, despite the net loss of water resources."[20] The court rejected "the argument that ecological improvement can "mitigate" the injury when a junior water right holder impairs a senior water right" and required in-time, in-kind mitigation to prevent impairment of a senior water right.[21] The "in-kind" requirement, sometimes referred to as "water for water," rejects the concept that habitat improvements (for example, adding woody

[3] SITC v State Department of Ecology pages 583-84.

debris or restoring wetlands) can replace senior water rights. Water mitigation must replace senior water right impairment. The "in-place" requirement means that mitigation water must be returned to the same stream where senior water rights were depleted. Under *Foster,* mitigation through the replacement of water in other parts of a basin is generally not allowed, although ESSB 6091 now authorizes such mitigation in the context of permit-exempt wells.[22]

These cases significantly influenced the development of and decision in the *Hirst* case. The Growth Management Hearings Board, the administrative law body that heard the first appeal in the case,[4] stated "it is the local government-and not Ecology-that is responsible to make the decision on water adequacy as part of its land use decision, and in particular, with respect to exempt wells."[23] Citing *Kittitas v. EWGMB,* the Washington Supreme Court upheld this determination, finding that Whatcom County must "plan for land use in a manner that is consistent with the laws regarding protection of water resources." [24] The Court held that Whatcom County must require applicants to show that water is legally available for permit-exempt wells before issuing building permits and subdivision approvals for projects relying on such wells, rather than merely determining whether water is physically available. Failing to determine legal availability "would allow the county to condone the evasion of existing water rights, contrary to law."[25]

In response to *Hirst*, Whatcom County developed general policy proposals to address water resources. These proposals included:

1. Pursuing "public basin wide mitigation strategies to protect instream flows,"

[4] The Growth Management Hearings Board ""hear and determine" allegations that a city, county, or state agency has not complied with the goals and requirements of the Growth Management Act…" (http://www.gmhb.wa.gov/Information/Index)

2. “Funding and complet[ion] of the County’s groundwater model,” and

3. “Continuation of on-going long-term water supply planning.” [26]

ESSB 6091 provides further guidance for Whatcom County to address water resources through implementing an updated watershed plan that will “offset potential impacts to instream flows associated with permit-exempt domestic water use.”[27] Not only does Whatcom County need to update its watershed plan involving “initiating governments” and “planning units,” Whatcom County must provide the updated watershed plan by February 1, 2019 or the Department of Ecology will adopt rules for Whatcom County that meet the requirements by August 1, 2020.[28] The initiating governments and planning units must provide unanimous approval of the watershed plan in order for the watershed plan to move forward towards implementation.[29]

The ESSB 6091 mitigation requirement is based on the allowance of new permit-exempt wells using 3,000 gallons per day as established by ESSB 6091.[30] Whatcom County has estimated that there are approximately 6,387 lots outside of water service areas where water sources are undetermined and would likely depend on permit-exempt wells.[31] The daily water allowance of 3,000 gallons and 6,387 lots results in nearly 20,000 acre-feet per year of water use. This figure, however, assumes all lots within water service areas will connect to existing water service lines rather than install permit-exempt wells. Due to the expense of connecting to water service lines and water service areas lacking sufficient water rights (discussed more in depth later), this figure underestimates the amount of water that will need to be mitigated.

To meet the requirements of ESSB 6091 and watershed planning goals, a number of mitigation policy options have been proposed to Whatcom County, three of which will be discussed in this policy analysis.

Policy Options

The purpose of this policy analysis is to discuss and compare three policy options that are proposed to Whatcom County as possible approaches to addressing the requirements in *Hirst* and ESSB 6091. These policy options are the extension of existing public water supplies to serve areas that do not have such service, the construction of reservoirs to provide water storage capacity, and the development of a water banking program. Three criteria will be used to evaluate each policy option: cost-effectiveness, implementation/feasibility, and compliance with law. The three criteria relate directly to the requirements of ESSB 6091 which establishes a $300 million statewide budget, requires a feasible policy response within a short timeframe, and necessitates any policy response to comply with ESSB 6091 as state law. These criteria are further defined as:

- *Cost-Effectiveness*: assesses "how well a policy achieves the nature…of the desired outputs… [and] assumes…fixed resources,"[1] such as a budget, and will be determined by an estimate of implementation costs and maintenance costs (overall projected cost) over a period of twenty years. Consideration of options with high implementation and low maintenance costs will be balanced against options with low implementation and high maintenance costs.
- *Implementation/Feasibility*: assesses and includes, but is not limited to, the amount of time required for full implementation, how reasonable it is to implement the policy response (i.e. what actions are needed to develop and implement the policy response, and political acceptability), and technological capabilities. Feasible solutions will require

shorter implementation periods, ease of implementation, and low technologically-based requirements while still meeting long term goals. Feasible policy responses will be those that can be articulated and justified within the ESSB 6091 timeframe. ESSB 6091 requires the planning unit to provide an updated watershed plan meeting all requirements by February 1, 2019, otherwise the Department of Ecology may adopt rules meeting ESSB 6091 requirements by August 1, 2020.

- *Compliance with Law*: assesses the extent to which each policy response complies with ESSB 6091, the governing law, and within the framework of state water law. A preliminary test will look at if the policy response meets the requirement to "enhance stream flows and not result in negative impacts to ecological functions or critical habitat."[2] This criterion must be met in order for a solution to be considered and assessed against the other forms of federal and state law and regulations. Any option that does not meet compliance with law will not be considered as a policy solution.

These three criteria assess the reasonableness and feasibility of the following policy options.

Public Water Supply

Whatcom County provides public water through municipal water suppliers, water associations, and water districts. These public water providers hold water rights within service areas and provide water to new development dependent on the available water from their water right. In areas with water piping infrastructure, new development may have the option to hook into an existing water right held by a municipality, water purveyor, or water district.

Assuming there is water available through these entities, the property owner in need of water access must install the infrastructure necessary to connect to the existing water lines.

Whatcom County recently updated its Coordinated Water System Plan (the Plan) in 2016. The Plan, mandated by state law,[1] provides a strategy for "public water systems…that identifies the present and future needs of the systems and sets forth means of meeting those needs."[2] The Plan only addresses larger, Group A public water systems (more than 15 connections). The Plan does not address either Group B water systems (fewer than 15 connections) or permit-exempt wells because recording keeping, monitoring, and metering are insufficient to provide accurate data.

Based on the projected growth of Whatcom County,[5] 68 of the 181 Group A water systems have enough water rights for current and future water needs while 22 are currently exceeding or are projected to exceed water rights limits as Whatcom County grows.[3] The Plan does not have data for the additional 12 Group A water systems, nor does it provide data relating to the 234 Group B water systems or permit-exempt wells. The water systems currently exceeding water rights are situated predominantly in the north of the county while the water systems unable to meet future water needs are focused on the west side and in the center of the county. These are areas where new development likely would rely on permit-exempt wells because the water districts cannot provide service, based on a lack of available water. In areas with sufficient water, property owners may rely on permit-exempt wells where the cost of hookups to water systems are high.

[5] The Coordinated Water System Plan projects Whatcom County's population to increase from 205,800 (2013) to 275,450 (2036). Approximately 10,000 of that projected growth will be in unincorporated Whatcom County.

Cost

The cost of connecting to existing water service lines varies depending on the specific municipality, water purveyor hook-up costs, and the unique situation of each public water supply project. As one example, the City of Bellingham provides fee sheets that provided information relevant to the projected costs for the installation of service lines, meters, and system development within Whatcom County. Most single-family homes are able to use a 5/8" or 3/4" diameter meter. For the water main tap, installation of water service pipe, water meter, and box, the price ranges from $1,230-$1,370.[4] These prices, however, only reflect service lines of no more than 80 feet and do not include any excavation, backfill, or site restoration. If new piping needs to be installed under a road or in an area without an easement, the property owner is required to pay for further permits and any improvements necessary.

In addition to the water service and meter fees, water system development charges are flat rate fees required for any new development and are dependent on the size of meters. For 5/8" or 3/4" meters and for water only the fees outside of Bellingham city limits are $6,277 and $9,419, respectively. If outdoor irrigation systems are necessary, an additional $3,209 and $4,812 in development charges are required. Combined with the meter and basic service installation costs, a property owner can expect to pay between $7,507 and $10,789 for basic water access. Including irrigation increases the price from between $10,716 and $15,601.[5]

These costs only apply to properties to connect to a water line within 80 feet of the property.[6] Much of Whatcom County is zoned for a minimum of 5-acre parcels. For the numerous properties located away from municipalities, new connections to existing water lines can require the extension of water lines for a quarter mile or longer. Assuming the price for 80 feet of new service line remains consistent, the cost for only the water main tap, installation of water service pipe, water meter, and box for properties up to a quarter mile from existing service lines will be approximately $22,605.

This estimated cost, applying the City of Bellingham fees, is also supported when looking at individual water districts. For example, Water District 7 charges approximately $8,000 minimum for hookup. This cost does not include any labor or materials costs, nor does it include the cost to connect to "the nearest adequate main."[6] The costs for labor and materials easily increases the total cost of public water supply between $10,000 and $20,000 for a property owner based on the prices discussed above to connect to existing water service lines. These fee amounts are similar for other Whatcom County water district and associations including Lake Whatcom Water District.[7]

Implementation and Feasibility

Providing water from public water supplies to homes that would otherwise rely on permit-exempt wells may be feasible in the service areas of public water suppliers with sufficient water rights. Because of the dispersed nature of new development relying on permit-exempt wells, many new homes will be constructed outside the service areas of public water suppliers.

[6] For properties within Whatcom County that are located within minimal distances to water service areas, connecting to existing public water supplies with available water rights could be encouraged and implemented with any policy option.

Furthermore, property owners may view the cost per home of public water system hookups to be prohibitive.

Property owners may also object to public water association hookups because of the cost and effort of obtaining necessary permits. Whatcom County requires permits for most types of projects especially those that disturb land to any degree including installing new water lines. Permits including land disturbance, natural resource assessment, shoreline, and State Environmental Protection Act applications are commonly involved with new development, land disturbance, and environmental concerns related to new development and could apply to new water line extensions.[8]

Once all aspects of a water service connection project are permitted, development and construction can occur. If new users need to cross streams, roads, wetlands, or any other existing natural or built area, they will need to comply will all of the above-mentioned laws and pay for additional permitting. If water line extensions affect critical areas, such as wetlands and shoreline, additional analysis and mitigation could be required.

For properties located within or nearby existing water service areas or water associations, the water provider must have adequate water rights in order to allow for new water appropriators. The Coordinated Water System Plan defines water availability as "when an applicant for a project requiring potable water has access to…water which meets the intent of the Growth Management Act" by maintaining rural character and limiting intensive rural development.[9] Some of these water associations no longer have any availability for new water

connections or are very limited. This is based on the water right they hold, the number of existing users, and the amount of water necessary for new developments.[10]

Compliance with Law

Public water supply can comply with law so long as there are adequate water rights available for new users to appropriate. Increasing connections to existing water service lines in areas with available water allows for better monitoring and metering of water usage and could prevent the creation of new water rights through groundwater withdrawals thus supporting ESSB 6091 streamflow requirements. Public water suppliers have quantified water rights, whereas permit-exempt wells create new, more junior, water rights. Rather than increasing the number of withdrawals and water rights, public water supply connections can leave unappropriated water rights in the ground or in stream.

Although public water supply provides a supplementary policy option to help Whatcom County comply with ESSB 6091 streamflow requirement, public water supply does not necessarily improve instream flows directly and would need to be implemented with another policy option. Public water supply requires an increase in infrastructure throughout Whatcom County to provide water service lines to those in need of water. Although public water supply can provide for better monitored water resource usage, the combination of infrastructure required for new water users to connect to existing water service lines, cost, feasibility, and compliance with law, however, limits public water supply potential as a sole solution for Whatcom County.

Reservoirs

Reservoirs periodically are proposed as a policy option to address water shortages. Recently, for example, several Whatcom County elected officials suggested damming part of the Nooksack river to address water shortages.[1] A reservoir is also proposed as part of the implementation of instream flow protection and water resource planning in the Dungeness basin.[2]

Reservoirs provide water storage through natural or engineered lakes that can be drawn from seasonally to aid in consistent, year-round water availability. For areas without existing natural reservoirs or accessibility to dams, engineered reservoirs provide an option for increasing water resources during periods of seasonal drought. Land availability, however, proves to be a limiting factor for the size and viability of engineered reservoirs. The following examples of United States reservoirs shed light on the various amounts of land necessary for man-made reservoirs.

States operating under prior appropriation water law provide numerous examples of using reservoirs as the main water resource to mitigate water resource needs. Many reservoirs are created by dams including the well-known example in the Colorado River District, which utilizes Lakes Powell and Mead as engineered reservoirs for seasonal water resource use.[3]

Several examples of built reservoirs without dams exist in Texas, where the Lower Colorado River Authority is constructing the Lane City Reservoir, the largest reservoir to be built on the lower Colorado basin for several decades.[4] Northern California provides another example of two off-stream water storage projects proposed to divert water from the Sacramento River during high-flow periods in order to mitigate water resource needs during dry periods.[5]

Currently several off-stream reservoirs are proposed in Washington State similar to the reservoirs in Texas and California. The proposed Black Rock Reservoir in Washington's Yakima River Basin "would be larger than all five of the existing Yakima River Basin storage lakes combined."[6] The United States Bureau of Reclamation began the feasibility study for the Black Rock Reservoir in 2003 and an environmental impact statement was completed six years later.[7] This plan, however, is mostly obsolete due to the community's major concerns of costs versus benefits.[8,9]A slightly less ambitious project that is still underway is a feasibility study conducted by the Department of Ecology along the Columbia River Basin to evaluate and appraise developing storage reservoirs in 21 potential sites.[10] From this study, Washington is proposing the Dungeness Off-Channel Reservoir project outside of Yelm, Washington which remains in the feasibility stage.[11]

Cost

For reservoirs to be effective at providing additional water supplies, they need the capability of holding tens of thousands of acre-feet of water. Based on the estimate from ESSB 6091, Whatcom County will need to mitigate for approximately 20,000 acre-feet of water per year. Between the cost of obtaining land and the construction of the reservoir, reservoirs require substantial financing and access to resources.

One example of a reservoir that would be large enough to meet Whatcom County's needs is the Lane City Reservoir (LCR), located near the Texas Gulf Coast. The LCR, which may be completed in 2018, is the "first significant new water supply reservoir in the lower Colorado River basin" and aims to reduce water resource stress currently experienced by neighboring lakes and rivers.[12] The LCR is estimated to hold 40,000 acre-feet and provide an additional

90,000 acre-feet/year of water.[13] The total projected cost of the development and implementation of the LCR is $206 million with an annual maintenance cost of $19 million.[14] The physical reservoir comprises 1,100 acres with an additional 1,200 acres surrounding the reservoir as buffer and embankments. The Lower Colorado River Authority acquired the nearly 2,500 acres for $18 million in 2013.[15] In comparison, an acre in Whatcom County's rural zone costs on average between $5,000 and $10,000, while an acre in the agricultural zone can start at $50,000. To acquire 2,500 acres for a reservoir the size of the LCR in Whatcom County could cost between $12.5 million and $125 million.[7]

Within Washington State, the Black Rock Reservoir and Dam project was proposed in the Yakima River Basin to divert water from the Columbia River and hold around 1.6 million acre-feet of water.[16] The Bureau of Reclamations' 2008 Cost-Risk Analysis for the Black Rock and Wymer Dam and Reservoir Alternatives showed the Black Rock Appraisal-Level Project Cost Estimates to be from the low end of $4 billion to an upper end of $10.5 billion which includes land acquisition and recreation costs.[17] In part because of these large cost projections, the Bureau of Reclamation put the project on pause for the foreseeable future as of 2008. This occurred even after years of research and environmental impact statements that totaled around $18 million.[18]

The proposed Dungeness Off-Channel Reservoir is substantially smaller than the LCR, only incorporating 88 acres of land within a newly proposed 320-acre park.[19] The goal of the reservoir is to increase instream flow levels to the Dungeness River, which is experiencing

[7] These prices are based on vacant land for sale from numerous real estate sites including Land Watch, Zillow, and Redfin. The price of an acre varies significantly dependent on location of the land in relation to cities, whether the property is within a water district with water availability, and how the property is zoned (i.e. rural residential versus agricultural). These prices are by no means comprehensive but do provide an estimation and show the variability in land prices within Whatcom County.

inconsistent instream flow levels due to over-appropriation and drought. Although the cost-benefit analysis is still underway, early projection of the cost of the proposed project is $24 to $35 million for land acquisition and construction.[20] Maintenance costs have yet to be reported. The Dungeness Off-Channel Reservoir is projected to add anywhere from 25 to 35 cubic feet per second to the Dungeness River, which translates to 18,000 to 25,000 acre-feet per year which meets the minimum water requirements for Whatcom County based on the estimate from ESSB 6091.[21] The project is currently moving slowly, in large part due to lack of funding from the state or federal governments. Unlike the Dungeness Off-Channel Reservoir where funding was expected, there is currently no money allocated for a reservoir within Whatcom County.

Each of these reservoir examples reveals the trends of high upfront and maintenance costs as well as dependence on significant amounts of land. The Dungeness Off-Channel Reservoir calls for nearly 400 acres while the much larger LCR in Texas sits on over 2,000 acres. As for range of costs, the Dungeness Off-Channel appears affordable at $24 to$35 million when compared to the LCR project at $206 million plus an additional $19 million per year in maintenance. If the Black Rock Reservoir had kept moving forward then the range of costs for reservoirs is pushed to $4 to$10.5 billion. The cost of land, maintenance, and infrastructure required for a reservoir in Whatcom County to provide adequate water storage would require around ten percent of the $300 million statewide funding allocation by ESSB 6091.[22]

If the reservoirs are treated functionally as a new public water supply, the water will then need to be accessed by new water users after the reservoirs are constructed. Whether the reservoirs provide water directly to new users or to larger water purveyors, reservoirs would then require new users to hookup to existing or new water service lines similar to the Public

Water Supply section. The $10,000 to $20,000 cost per new water user established in the public water supply section can then be implemented for reservoirs. Along with the public costs affiliated with construction and maintenance of a new reservoir, additional private costs for connecting to new water service areas created by the reservoir will be necessary.

Implementation and Feasibility

The implementation of reservoirs is technically complicated, time consuming, and policy driven. The construction of reservoirs requires locating and acquiring large tracts of land suitable for retaining millions of gallons of water with space to prevent and protect neighboring communities from possible flooding or breaching of the reservoir. The process for implementing reservoirs typically begins with extensive feasibility studies that look at environmental impacts, analyze alternatives, and provide planning reports for next steps.[23] Once feasibility is established, the technical aspect including design, permitting, construction, and maintenance can begin.

The larger the reservoir, the more complicated the feasibility and implementation are likely to be. The Lane City Reservoir (LCR), has proceeded from planning to implementation in an unusually short period of time: approximately six years. This project is unusual because the area the reservoir is located has limited environmentally sensitive areas and the permitting process was completed in a short time period. Although the LCR project required extensive federal and state permitting under Section 404 of the Clean Water Act; substantial development permits; cultural resources reports; biological assessments under the Endangered Species Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act; water rights review required through the Texas Water Code; and compliance with other regulations and policies, the permitting

process was completed within a two-year period, an exceptionally short processing period for a project of this size when several of the permits often require up to four years or more of processing.[24] The permitting process for the LCR was also straightforward due to the Lower Colorado River Authority holding a substantial water right which did not require any changes "to the authorized place or rate of diversion, resulting in a simplified amendment process."[25] Because of the unique situation and regulatory requirements for the LCR, the implementation process from start to finish will be approximately six years: two for the regulatory and permitting process, one year for financing, and three for construction and completion. This brief time frame is not realistic within Whatcom County in part because Whatcom County does not have an existing or substantial water right, but also because reservoir establishment would require environmental impact assessment and tribal involvement similar to the Black Rock Reservoir.

The Black Rock Reservoir, as part of the Yakima River Basin Water Storage Feasibility Study, would have involved "a diversion and partial exchange of Columbia River water for Yakima Project water" which came from neighboring streams used predominantly for irrigation.[26] The Black Rock Reservoir would be filled by pumping water from lakes fed by the Columbia River. These lakes would maintain the Black Rock Reservoir at full capacity, which was proposed to be approximately 1.3 to 1.6 million-acre feet. This project required substantial research and development of an environmental impact statement (EIS) under the State Environmental Protection Act (SEPA) that took around five years to draft and another year to produce a final draft with responses to the several hundred public comments. The EIS was required due to the determination of a "finite supply and limited storage capability…[of] the [Yakima River] basin's aquatic resources—specifically those resource supporting anadromous fish."[27] Another major

concern with the Black Rock Reservoir is the risk of seepage and raising water tables in neighboring areas including the Hanford Nuclear Reservation Site.[28] Although this is unique to the Black Rock Reservoir project, understanding major implications of reservoir development requires substantial research, including hydrological and geological studies, environmental impact assessments, and economic/human impacts.

Likely reservoir sites in Whatcom County include large tracts of land along state protected shorelines, which tend to include critical areas such as wetlands, habitat conservation areas, and geologic anomalies (i.e. alluvial fans).[8] These environmental characteristics may present challenges to the acquisition, environmental assessment, and permitting of large projects that require substantial amounts of land. Such locations may also affect usual and accustomed fishing grounds for tribes and would require tribal consultation and agreement.

Compliance with Law

Reservoirs are capable of mitigating for water resource needs and can "enhance stream flows…" but the development of a single reservoir likely would not meet the ESSB 6091 requirement to mitigate and prevent "…negative impacts to ecological functions or critical habitat" [29] from geographically dispersed water withdrawals. A reserved supply of water aids in maintaining water availability through dry seasons and can be used to protect instream flows through reducing surface and groundwater withdrawals.[30]

Although ESSB 6091 diminishes the "in-time, in-kind" requirement established in *Foster,* mitigation measures that are in-time and in-kind still hold the highest priority.[31] Reservoirs can

[8] Data retrieved from Whatcom County GIS.

provide mitigation, but they do not necessarily address water withdrawn from all affected watersheds. Despite reservoirs aiding in meeting the streamflow requirements of ESSB 6091 through reducing the creation of water rights that depend on groundwater withdrawals, preventing "negative impacts to ecological functions or critical habitat" is challenging for reservoirs.[32] Regional and federal environmental laws such as the National Environmental Protection Act (NEPA), State Environmental Protection Act (SEPA), Shoreline Management Act (SMA),[9] Critical Areas Ordinance (CAO),[10] and the Endangered Species Act (ESA) can severely limit where reservoirs can be located as well as their size. Mitigating for impairment of endangered species, critical areas, or shorelines is extremely expensive and, in some cases, impossible. These regulations thus make it difficult to determine feasible land areas and limit the potential of reservoirs providing a cost-effective and feasible water resource management option.

Water Banking

Many western states, and some counties within Washington, have implemented water banking. This makes water banking a potential strategy for Whatcom County to use in order to address water availability problems. Water banking is broadly defined as a management strategy or practice for "surface, groundwater, and storage [rights]".[33] Within that broad framework, water banking can take various forms, including surface and groundwater storage for use or sale during dry periods, water markets (water rights are bought and sold by the water

[9] The Shoreline Management Act (SMA) "manages and protects the shorelines of the state by regulating development in the shoreline area." Retrieved from http://mrsc.org/Home/Explore-Topics/Environment/Environmental-Laws/Shoreline-Management-Act.aspx

[10] The Critical Areas Ordinance manages "geologically hazardous areas, frequently flooded areas, critical aquifer recharge areas, wetlands, and fish and wildlife habitat conservation areas." Retrieved from http://www.whatcomcounty.us/723/Critical-Areas

bank or water users), and water trusts (water rights are held within a trust). Under all of these systems, water banking "banks" unused water rights for people to buy or sell when they need to increase or decrease their water usage. Water banking offers a managed approach to addressing water resource allocation as well as monitoring for water resource availability. The goal of water banking is to maintain water availability seasonally and for future water users; to promote conservation; and to develop markets to better manage water resources.[34]

Cost

Kittitas County provides an example of a water banking program that could be a model for Whatcom County. The Upper Kittitas ground water rule withdrew "from appropriation all unappropriated groundwater within upper Kittitas County pending completion of a groundwater study."[35] The Department of Ecology prepared a cost-benefit analysis for the implementation of the Upper Kittitas ground water rule, addressing the probable costs for mitigation, metering and reporting, recording covenants, and administrative costs over a 20-year period.[36] These costs are paid for by a combination of taxes and purchasers of water credits. The Department of Ecology estimates the total costs of implementing the ground water rule to be $22,320,000 over 20 years for taxpayers.[37] The majority of this cost projection is devoted to acquiring mitigation water credits. Mitigation water credits are described by the Department of Ecology as either acquiring and retiring existing ground water pumping rights or transferring surface water rights to a mitigation purpose.[38] Surface water rights can serve a mitigation purpose through ground water recharge or an instream flow dedication.

Currently the Kittitas County Water Bank owns 100 acre-feet of water with a plan to purchase an additional 583 acre-feet of senior water rights for $2.7 million.[39] This additional

water is projected to meet the water needs of thirty to forty years of development at the current development rate, with the costs for water users remaining the same.[40]

Implementation and Feasibility

The Kittitas County Water Banking program provides a model for Whatcom County with respect to hydrogeological similarities. Both Kittitas County and Whatcom County contain hydrologically-connected basins. This means surface and groundwater sources generally are connected and can be affected by overdrawing water from either source (i.e. water pulled from groundwater through wells can impact surface water levels and vice versa).

Kittitas County communicates the availability of water to the public through a map with a simple "green, yellow, red" color scheme. In "green" areas, water is legally available, while "yellow" areas do not have legally available water without mitigation. "Red" zones do not have legally available water due to year-round closed-basins or over-appropriation of water rights. Green and yellow areas obtain access to water through purchasing water rights from the bank, requiring a permit from Ecology which can take anywhere from nine months to a year to process.[41] For developments in the green areas that fall under water budget neutral mitigation, permitting is relatively simple and can be completed in roughly two weeks. Those that require a permit can take up to a year to process except for specific basins. Similarly, developments proposed in the yellow zone can receive a mitigation certificate in less than six months with water budget neutral mitigation while a permit can take up to a year to process.

The individual well site review and permission to drill the well is only available to those located in green zones with water budget neutral mitigation. This step is then followed by the

application for water mitigation as well as providing an irrigation affidavit to "determine what package to purchase."[42] This step also includes signing a metering agreement which requires the installation of a meter into the main water line to meter water usage and monitor accurate use of water from purchased packages.

In areas where surface water is heavily impacted by growth, the water banking program in Kittitas County provides water use packages at different rates for water users to purchase. The two packages both offer 275 gallons per day (averaged annually) for indoor domestic use. Package A offers only 275 gallons per day for indoor use, while Package B offers an additional 25 gallons per day for those who do not have access to outdoor irrigation.[43] In order to purchase one of these packages, Kittitas County requires an eligibility review, well site review, application for water mitigation, recording of the mitigation certificate as well as a metering agreement, and finally a completed "Adequate Water Supply Determination" from Kittitas County Public Health.[44]

The last step before applying for a building permit is having Kittitas County Public Health provide an "Adequate Water Supply Determination" which establishes "mitigation, well location, well construction, well flow, and water quality."[45] Kittitas County Public Health is responsible for monitoring total consumptive use and providing for access to water metering data to water users. Under the Kittitas County Water Bank Mitigation and Metering Program Policy and Procedures, the Kittitas County Public Health Department must maintain the water usage "less than or equal to the sum of the recorded certificate volumes as a whole."[46] The water usage data retrieved from the newly installed water meters must show that the overall water usage is

less than or equal to what allocated water amounts established through the mitigation certificates and package purchases.

Although Kittitas's water exchange program provides a model for Whatcom County, it is important to note one important distinction. A lengthy state process resulted in adjudicated water rights in Kittitas County, while water rights in Whatcom County have not been adjudicated.[47] This means that tribal water rights based on off-reservation fishing rights have not been quantified in Whatcom County and water rights in overallocated watersheds have not been adjusted. A water bank program in Whatcom County would be based on Ecology's best estimates, rather than an official adjudication. Tribal water rights related to off-reservation fishing rights would only be reflected in the surrogate of instream flows, which requires water to be retained in streams for the purpose of providing fish habitat.[48]

Compliance with Law

Water banking provides a policy option that meets the requirements established by ESSB 6091. Water banking requires administrative infrastructure rather than physical infrastructure necessary for reservoirs and public water supply. As water banking reallocates existing water rights, it could meet the requirement of ESSB 6091 to "enhance streamflows and not result in negative impacts to ecological functions or critical habitat," assuming that sufficient water rights are available without depleting instream flows.[49] Also, implementing water banking is a clear goal in Whatcom County's Comprehensive Plan and therefore complies with policy goals and objectives laid out by Whatcom County government.[50]

One aspect of the Kittitas County Water Bank program applicable to Whatcom County and in line with ESSB 6091's requirement to protect ecological function is the implementation of Water Budget Neutrality (WBN). A withdrawal is water budget neutral when its "impact to area streams is offset by water from existing water rights being left in-stream. The consumptive use (amount of water not returned to rivers and streams) does not exceed the amount of water of these existing water rights."[51] In order to obtain new water uses, the future water user purchases part or all of an existing water right through a water bank which holds and manages other existing water rights as a trust. The water held in this trust is maintained as an instream flow water right. The Department of Ecology simplifies this definition and refers to mitigation as where the "coverage (or protection) under a senior water right (pre-May 10, 1905), with the benefit that a new withdrawal is "neutralized" by water from an existing right being left in the stream."[52]

The Washington Administrative Code (WAC) requires WBN projects to be determined by the Department of Ecology.[53] The permit for the Department of Ecology determination requires "Identification of one or more water rights that would be placed into the trust water right program to offset the consumptive use…associated with the proposed new use of groundwater."[54] WBN is not only exemplified in the Kittitas water bank, but also similarly supported by ESSB 6091.

Comparative Analysis of Policy Options

Cost

The public and private costs of each policy option provide a way to compare the overall costs between each option. Public costs are those paid through subsidies while private costs are placed on individual water users. Each policy option allocates public and private costs differently, resulting in a ranking of low, medium, and high overall cost.

Public water supply depends primarily on private costs. Public subsidies typically have not been provided to aid new users to connect with existing water service areas. Although public water supply may have high private costs, approximately $10,000 to $20,000 per new water user, it does not necessarily depend on public subsidies.

The public costs for reservoirs from the examples discussed in the reservoir section range from $24 million to $10.5 billion. The private costs stem from users needing to connect to the reservoir through new water piping infrastructure, trucks, or other water transporting forms. Assuming piping infrastructure is proposed for new water users to obtain reservoir water, then the private cost is similar to that of public water supply, or approximately $10,000 to $20,000 per user. Reservoirs have the highest public and private costs because they rely on taxpayer monies for land acquirement, construction, and maintenance. Once constructed, the costs shift to private as individual water users must then connect or acquire the water from the reservoirs.

Water banking incurs public costs through the acquisition of water rights and administrative oversight paid for through public subsidies. The projected cost of the Kittitas Water Exchange Program is approximately $20,000,000 over 20 years, which includes purchasing

adequate water rights and administrative support. Although this cost is incurred by taxpayers regardless of their need to take part in a water bank, the annual additional taxes per person are approximately $6. [11]

The following table displays how each policy option depends on different levels of public and private costs:

Policy Options	Public Costs		Private Costs	
	Low	High	Low	High
Public Water Supply	X			X
Reservoirs		X		X
Water Banking	X		X	

Reservoirs have the highest public and private costs placing them in the highest overall cost category. Public water supply has low public costs, but high private costs giving them a medium overall cost category. Water banking has the lowest public and private costs making them the lowest cost policy option. This summary is illustrated in the table below:

Policy Options	Cost		
	Low	Medium	High
Reservoirs			X
Public Water Supply		X	
Water Banking	X		

[11] This is based on the 2016 Whatcom County census which approximates the number of taxpayers around 173,440. Retrieved from https://www.census.gov/quickfacts/fact/table/whatcomcountywashington/AGE115210

Implementation and Feasibility

Public water supply relies predominantly on water service areas having adequate water rights to provide water to new users. For new development to obtain a share of these water rights, they must be able to connect to existing water service lines which are not necessarily close by. This process then requires infrastructure development to expand service areas and is paid for by the individuals requesting connection. For service areas with limited or no spare water shares, property owners may have limited options for obtaining water access whether connecting to a water service area farther away or developing an onsite water catchment system. Although public water supply places the burden on individuals rather than the public as a whole, the permitting, construction time, and the high cost of connecting to water service areas makes public water supply a challenging and expensive option for individual property owners.

Reservoirs are challenging to implement as they require substantial time to permit, develop, and construct. Not only do they require considerable time, they rely heavily on technology and intensive maintenance. To meet the ESSB 6091 timeframe requirement of having a plan by February 1, 2019, a reservoir is virtually impossible due to the need to acquire land and develop a preliminary plan in less than one year.

Water banking is predominantly implemented administratively. As the Kittitas example shows, understanding where water is available and how to better distribute the water through packages provides for better management. The technology needed to determine water availability already exists and is being used within Whatcom County to map areas with additional

water available for appropriation. To develop and implement a water bank requires organizations to manage gathering excess water rights and then redistributing them to new water users or water users who need additional water availability. Rather than depending on increases to infrastructure, such as reservoirs and the extension of water lines for hookups to public water supply, water banking depends on administrative organization and management. Through using existing water banking models and existing water mapping technology, water banking is more feasible than reservoirs and public water supply.

From the preceding analysis, the implementation and feasibility of each policy option can be ranked from low, medium, to high. Reservoirs require the involvement of numerous stakeholders including property owners, tribes, other governmental entities, and technological experts. Between the large tracts of land necessary for development to the high costs of implementation, reservoirs rank the highest level for implementation and feasibility. Without any site currently proposed in Whatcom County, designation and planning of a reservoir within the ESSB 6091 timeframe is virtually impossible.

Public water supply requires fewer stakeholders to be involved (predominantly the new water user, water association, and permitting entity). The cost, the ability to connect to additional and available water shares, and the potentially complicated permitting process, makes public water supply more feasible than reservoirs, but still a medium level of requirements for implementation and feasibility.

Water banking requires limited technology and time compared to reservoirs and public water supply and depends primarily on administrative organization and management. These

characteristics support water banking as the easiest, or lowest level, to implement and most feasibly policy option of the three policy options as seen in the table below:

Policy Options	Implementation and Feasibility		
	Low	Medium	High
Reservoirs			X
Public Water Supply		X	
Water Banking	X		

Compliance with Law

The three policy options discussed can meet the requirements of ESSB 6091 as well as federal environmental laws and regulations. Each policy option, however, requires different levels of assessment and compliance with the various laws.

Public water supply could help meet the ESSB 6091 streamflow requirement as part of a combined policy solution, but this approach faces challenges when assessed through state and federal environmental regulations. Increasing infrastructure for additional water service connects requires environmental impacts through installing piping underground and in areas that may experience critical area restrictions. Although public water supply depends on less land area disturbance than reservoirs, the often-necessary environmental impacts to connect new water users to water service areas still presents regulatory challenges for public water supply. This analysis places public water supply within the medium level for difficulty to comply with law.

Similar to public water supply, reservoirs could help meet the streamflow requirement of ESSB 6091. When assessed through the NEPA, SEPA, SMA, CAO, and ESA, reservoirs face serious

challenges. Because reservoirs depend on significant environmental impact, the process for meeting the requirements for the previously listed acts and ordinances adds significant difficulty to the implementation of reservoirs. Each act and ordinance can take years to complete and require substantial commenting periods, assessment, and mitigation plans. These law-based challenges make reservoirs' ability to comply with all laws extremely difficult and ranks highest for difficulty.

Unlike reservoirs and public water supply, water banking meets the requirements of ESSB 6091 more easily. Water banking depends on administrative development rather than physical infrastructure that causes land disturbance and environmental impacts. With water banking only needing to comply with ESSB 6091, it significantly reduces any other regulatory challenges. Because of this, water banking complies with law and faces the lowest difficulty to comply with law compared to reservoirs and public water supply. This is further illustrated in the table below:

Policy Options	Compliance with Law		
	Low	Medium	High
Reservoirs			X
Public water supply		X	
Water Banking	X		

Recommended Policy Option

Based on the analysis of criteria for each policy option, the recommended policy option for Whatcom County is to develop and implement a water bank. By combining each of the tables above into one table, water banking requires the lowest cost, least challenges for implementation and feasibility, and the easiest policy option to comply with law. The following table illustrates a complete analysis of the three criteria and policy options:

Policy Options	Criteria		
	Cost	Implementation and Feasibility	Compliance with Law
Reservoirs	High	High	High
Public Water Supply	Medium	Medium	Medium
Water Banking	Low	Low	Low

Water banking provides a solution that is not only the most cost-effective, easily implemented and feasible, and complies with state and federal laws and regulations without difficulty, but also meets numerous goals under Whatcom County's Comprehensive Plan and Growth Management Act that relate to and require water resource management. These goals are further discussed through water banking's ability to meet additional policy goals such as integrating land and water resource planning, support planning through co-governance, and promoting conservation.

Additional Policy Goals

Although the policy option ultimately determined through the ESSB 6091 planning process may differ from the recommended policy option in this analysis, the following policy goals should be implemented. These goals can help ensure the success of the water resource management program determined and implemented through ESSB 6091.

Integrating Land and Water Resource Planning

Land and water are integrally tied to one another, as the use of one has direct impacts to the other. Increasing land use through development significantly affects water quality and quantity. Water availability provides a limiting factor on types and density of land use opportunities. Despite the interconnectedness of land use and water supply, there are few examples of an integrated approach to managing them. Often natural resource planning divisions focus on land use planning as a singular entity with discussion of, but not active integration of, water resource planning. Management of natural resources depends on not only integrating various natural resource and planning stakeholders, but also the ideas and practices used to manage land and water.

The unconstrained use of permit-exempt wells in Whatcom County has allowed for development in areas without legal water availability. Continued growth in areas without legally available water, as authorized by ESSB 6091, allows junior water users to rely on senior water users' rights. Whatcom County provides a clear example of the need for co-management of land and water resources. Whatcom County's Comprehensive Plan provides a framework in which to meet the ultimate goal of integrating land use and water resource planning.

The Comprehensive Plan "is intended to guide growth in unincorporated areas" in order to protect rural areas while supporting anticipated growth.[1] The Comprehensive Plan provides goals and policies to maintain rural character, integral to Whatcom County's character, economy, and environment.

The Land Use chapter of the Comprehensive Plan establishes the goal to "Ensure designation of sufficient land and densities, with consideration of water availability, to accommodate the growth needs of Whatcom County and protect the local economy, rural lifestyle, habitat, fish, and wildlife, which are the cornerstone qualities that make the county a desirable place to live."[2] To meet this goal, the Comprehensive Plan states that Whatcom County will:

> "strive to improve the predictability to property owners regarding the connection between legal water use, and land use and development by:
>
> • Supporting completion of groundwater studies that provide a better understanding of water quantities available and the connection between groundwater use and instream flow levels. •
>
> • Supporting the efforts of water purveyors to develop new legal water sources and the infrastructure and systems necessary to transport that water to existing water users that lack safe potable water or sufficient water rights.
>
> • Encouraging a negotiated water rights quantification and settlement between the Lummi Nation, Nooksack Indian Tribe and other water users in the Nooksack River basin.
>
> • Encouraging the Department of Ecology to protect instream flows, particularly in times of extremely low summer flows.
>
> • Coordinating with the Department of Ecology to find solutions to provide adequate water for out-of-stream users while protecting instream flows. Potential solutions may include consideration of recycling, conservation, water banking, public water system interties, stream recharge augmentation, change in place of use, desalinization and other alternative water supply measures.

• Requesting the Department of Ecology to create a water management plan for exempt wells in closed water basins that better aligns instream flows with current water rights and legal decisions on hydraulic continuity."[3]

Water banking meets this goal and these policies in Whatcom County's Comprehensive Plan. Water banking requires the knowledge of where water is available and in what quantities as well as managing land use through development. Kittitas County, for example, prepared extensive groundwater study models to better understand its unique water situation. From these studies, it developed a map for the water bank to decide whether a permit was needed and what type of permit would be required. With the different permits requiring multiple entities to be involved, such as the Department of Ecology, Kittitas County's water bank is not only utilizing co-management of land use and water resources, but also co-governance to address the issue.

Further integration of land use and water resource management provides a solution that addresses Whatcom County's water management issues through short-term and long-term strategies. Whatcom County's Comprehensive Plan (2016) Policy 2A-7 seeks to "Establish sufficient levels of developable residential, commercial, and industrial lands informed by approved population and economic forecasts, inventory of existing use, land capacity outside of critical areas and buffers, cost of infrastructure, legally available water, and goals and policies of all chapters of this plan."[4] This policy supports short-term action to prevent further infringement on water rights through managing current development in areas known to have legally available water, but also looks to the future to better prevent and mitigate potential water right impacts through comprehensive planning.

Managing development in Whatcom County by determining areas with legally available water is modeled in Kittitas County. As discussed in the water banking section, Kittitas County regulates new development through permits and mitigation in green and yellow zones depending on legally available water. These zone designations are effective in the short term through managing current development while providing a foundation for long term, comprehensive planning. Comprehensive planning provides goals and policies to better allow for smart growth while recognizing the importance and limitations of water resources.

Comprehensive planning tends to focus on local priorities particularly through local county governments and planning authorities. Along with the Comprehensive Plan, local water laws also require coordination between water availability and land use. Under the Revised Code of Washington 90.54.010 (b), comprehensive planning is needed to

> "ensure that available water supplies are managed to best meet both instream and off-stream needs... The people of the state have the unique opportunity to work together to plan and manage our water. Through a comprehensive planning process that includes the state, Indian tribes, local governments, and interested parties, it is possible to make better use of available water supplies and achieve better management of water resources. Through comprehensive planning, conflicts among water users and interests can be reduced or resolved. It is in the best interests of the state that comprehensive water resource planning be given a high priority so that water resources and associated values can be utilized and enjoyed today and protected for tomorrow."[5]

With the support of local water law, the GMA requires that counties adopt development regulations that are consistent with, and that implement, Comprehensive Plan policies that integrate water resource management and land use planning.[6] The Comprehensive plan supports this strategy in Policy 10F-7 stating "Pursue the most effective methods for protecting water quantity and quality, through both regulatory (e.g. zoning, enforcement, fines) and non-regulatory approaches (education, incentives, and technical/financial assistance).[7] Kittitas County has implemented a form of zoning based on known water availability. These zones are illustrated through using colors where green represents where water is available through a relatively short permitting process (as little as two weeks in some areas) and yellow zones where water is less available and can require a permitting process that takes six to twelve months.

Whatcom County can restrict development in areas where water resources are not legally available (i.e. all water is appropriated year-round or seasonally). This planning option provides an immediate result by restricting or better managing where development can occur in order to meet the rural area requirements in the GMA.

Planning Through Co-governance

Decisions relating to water availability in Whatcom County are currently threatened by limited communication between governmental agencies and fragmented planning and management. The Nooksack Rule establishes areas where water is unavailable seasonally or annually, and also establishes instream flow.[1] Part of the Department of Ecology's responsibility is to provide oversight of this rule. Significant development has occurred in the last two decades in areas in closed basins and areas that do not meet instream flows. These areas do not have enough water to support more water appropriations. Whatcom County and the Department of

Ecology can move towards resolution over how water availability is determined through co-governance. The importance of co-governing natural resources is well documented and water banking provides a management approach that supports the practice of co-governance.

Yaffee (1997) observed that "fragmentation of responsibility and authorities [where there is] a tendency to divide those responsible for resource management, diminishing accountability, and ensuring that management strategies are often piece-meal solutions to crosscutting problems" leads to recurring "environmental nightmares."[2] This fragmentation of water policy between Whatcom County government and the Department of Ecology has led to slow decision-making, limited responsibility taken by either party due to perceived shared responsibility, and noncomprehensive solutions from lack of communication, engagement, and conflicting interests and values.[3] These factors are manifested prior to, during, and after the *Hirst* case. Prior to and leading up to *Hirst,* neither Whatcom County government nor Department of Ecology fully took on the responsibilities established in state law and discussed in *Kittitas* and *Hirst. Kittitas* determined that counties are "responsible for land use decisions that affect groundwater resources," but Whatcom County nonetheless failed to address water use in its land use planning.[4] Thus, neither entity took full responsibility for the fact that development occurred in areas of water shortages, nor did Ecology or Whatcom County work together to develop comprehensive solutions. The fragmentation of responsibility and authority present in Whatcom County's approach towards water resource management has led to a tragedy of the commons. Water rights are being taken for granted and those with senior water rights are being undermined by junior water rights, including withdrawals by permit-exempt wells.

Kim et al (2015) go as far as quantifying political fragmentation to assess its impacts on water resource management. The results suggest that the greater an area's political fragmentation (multiple governments functioning together and separately in neighboring areas), the less effective water resource management tends to be.[5] The authors attribute this to the challenges of multiple governmental entities developing cooperative and effective strategies to manage water resources.[6] Although Whatcom County's governmental entities in this context are limited to two agencies, Whatcom County government and Department of Ecology, the factors discussed in the previous paragraph remain present and continue to result in fragmentation. Fortunately, two predominant entities could simplify actions towards defragmentation and more towards effective water resource management that protects water rights for all users.

The issues surrounding fragmented governance can be resolved in a number of ways. Yaffee (1997) suggests coordinated leadership teams between parties and "revitalized regional planning bodies" similar to the planning unit involvement required in ESSB 6091[7] Kim et al (2015) point to the need for governmental integration and/or the improvement or development of special water resource management districts to "fulfill holistic and systematic resource management."[8] One example of an integrated and special water resource management district program is the Walla Walla Water Bank. The water bank program in Walla Walla is managed in part by the Walla Walla Watershed Management Partnership which aids in developing water management plans. This partnership followed after the Washington Water Trust, called on by the Department of Ecology, "construct[ed] an administrative foundation, negotiate[ed] for the

acquisition of water rights through purchase and lease, and account[ed] for the credits available for purchase."[9]

Water banking promotes co-governance by requiring cooperation of governmental entities to develop and manage a market through which water rights are bought and sold. This approach can incorporate not only the Department of Ecology and Whatcom County government, but also Washington State government, conservation and water quality districts, non-profits, and other organizations.[10] The water banking programs in both Kittitas and Walla Walla both received state funding, providing greater support financially and politically to ensure improved water resource management. In Kittitas County, the Department of Ecology maintains a role through "transaction oversight and policy decision making" while private markets manage the water banking programs.[11] Co-governance between Whatcom County and the Department of Ecology can also aid in maintaining equitable prices for water banking markets.

Conservation

Under RCW 90.14.130, Washington State requires water rights to be beneficially used to the full capacity of the water right. Otherwise, "when it appears to the department of ecology that a person entitled to the use of water has not beneficially used his or her water right or some portion thereof…that unless sufficient cause be shown on appeal the water right will be declared relinquished."[1] Water banking provides a way to manage water resources and promote conservation by promoting water consumption only as needed.

The risk of losing any part of a water right supports the overuse of water resources and hinders actions to improve efficiency and conservation. Implementing a water banking program

allows water users to sell the amount of water right they do not need and/or purchase a water right at the necessary amount. This incentivizes water users to only pay for the water they need but provides flexibility if the amount they use varies from year to year. For farmers in particular, the long-term savings of paying for less of a water right by implementing water efficiency and conservation efforts will drastically reduce surface and groundwater withdrawals without risking the loss of access to water.

The ability to better conserve water through water banking falls in line with Whatcom County's Comprehensive Plan, the Growth Management Act, and ESSB 6091. Whatcom County's 2016 Comprehensive plan supports "conservation of productive agricultural land by requiring the use of best management practices including soil and water conservation…"[2] The Growth Management Act also requires conservation in particular through the preservation of rural lands.[3] The issues of infringing on rural character through over-appropriation of water was a major point made in the *Hirst* supreme court case. ESSB 6091 recommends projects that promote "water conservation [and] water reuse…to enhance streamflows and not result in negative impacts to ecological functions or critical habitat."[4] The promotion of conservation through the Comprehensive Plan, GMA, and ESSB 6091 can be addressed by water banking and will support better water resource management.

Conclusion

The scope of this research focused on the analysis of proposed policy options for Whatcom County to address *Hirst* and meet the requirements of ESSB 6091. Of the three options that are commonly proposed answers to Whatcom County's problems of water shortage

and depleted instream flows, water banking is the recommended policy solution. In addition, comprehensive planning and conservation are recommended to help ensure the success of any policy intended to address water scarcity problems. Other options for water resource management likely exist and could be applied to Whatcom County. Due to research and time limitations, a narrowed focus on three policy options allowed for initial determination of an effective policy solution. As discussed in the Water Banking section, water banking can be designed in various ways and with different structures and frameworks. For the purpose of this project, water banking was looked at more generally through the benefits and limitations of what water banking can offer rather than developing and proposing a certain form of water banking. Kittitas County's water bank provides a model that could be implemented in Whatcom County due to similar hydrological characteristics and case law requirements. Kittitas' model likely would still be revised to meet Whatcom County's unique needs.

Further necessary research includes proposing a specific type of water bank as well as determining the organization of it and what type of agency will be responsible for its management and funding. This will require consultation with numerous stakeholders including county, state, and tribal governments as well as public entities who have stakes in water resources. Relying on local governmental agencies to manage a water bank has benefits and limitations including local control but also limited manpower. These benefits and limitations would likely determine the ideal type of water bank that would meet Whatcom County's water resource management needs.

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